

**SPECIAL PROVISION
PROJECT # F-007(23)9
PIN # 5865**

SECTION 02753S

**PRECAST CONCRETE PAVING PANELS
FOR FULL-DEPTH REPLACEMENT**

Delete section 02753 and 02753M and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Saw-cut existing pavement.
- B. Remove full panel or partial panel of existing pavement.
- C. Excavate, clean, grade, repair and reconsolidate base.
- D. Install untreated base course materials as required.
- E. Install precast repair panels.
- F. Adjust pavement panel leveling bolts.
- G. Install urethane leveling grout support material.
- H. Install load transfer dowels and tie bars as required.
- I. Install load transfer dowel grout, and hardware grout.
- J. Seal Joints
- K. Surface Grinding.

1.2 RELATED SECTIONS

- A. Section 02721: Untreated Base Course
- B. Section 02752: Portland Cement Concrete Pavement
- C. Section 02754: Dowel Bar Retrofit
- D. Section 02981: Grinding Pavement
- E. Section 03055: Portland Cement Concrete
- F. Section 03152: Concrete Joint Control
- G. Section 03211: Reinforcing Steel and Welded Wire

1.3 REFERENCES

- A. AASHTO M 235: Epoxy Resin Adhesives
- B. AASHTO Technology Implementation Group Website:
<http://tig.transportation.org/?siteid=57&pageid=1826>

1.4 DEFINITIONS

- A. Precast Concrete Paving Panels, (PCPP): A non-proprietary system of precast panels of fixed dimension, installed on a carefully repaired base and compacted bedding material, doweled across longitudinal and transverse

joints as specified using dowel bars installed and grouted after panel placement. Portland cement concrete pavement panels manufactured off-site under controlled conditions. These pavement sections are part of an overall system designed for rapid installation in the field.

1.5 SUBMITTALS

- A. A detailed location and phasing plan for the precast pavement panel replacement coordinated with the traffic control plan and Section 00555 as per this Section, Article 3.1.
- B. Provide the following for Precast Concrete Paving Panels 5 days prior to beginning fabrication and casting work associated with the installation:
 - 1. Detailed shop drawings including plans, specifications, associated product data and fabrication tolerances.
 - 2. Details for installation of transverse load transfer devices, including supplier, materials, spacing and mechanisms used to transfer loads across transverse joints after slabs are placed.
 - 3. Longitudinal joint type (if required), locations and spacing, and the mechanism used to tie adjacent slabs together (if appropriate).
 - 4. Steel reinforcement details, including grade, coating and cover requirements.
 - 5. Details for lifting hardware, location, positions, and grout capping method. Alternate lifting devices other than those shown on the plans may be considered for approval by the Engineer.
 - 6. Urethane Leveling Grout material properties and supplier.
 - 7. Load Transfer and Dowel bar material properties and supplier (if required).
 - 8. Grout port type, pre-casting or site drilling approach, size, location, positioning, and capping method.
 - 9. Materials properties for the concrete mix design, and expected cure times to reach minimum strength requirements prior to moving and installation.
 - 10. Summary of approach to work with explanation of related fabrication and installation details. Include expected processes for fabrication, preparing the base, installing the panels, installing load transfer bars, leveling, grouting and grinding.
 - 11. Summary of equipment and experience necessary for the installation.
- C. Provide a Materials Data Sheet to the UDOT Engineer at least 5 days prior to installation for:
 - 1. Each shipment of Precast Concrete Pavement Panels.
 - 2. Base repair materials used.

3. Urethane Leveling Grout.
4. Load transfer and longitudinal tie dowel bars (if required).
5. Load transfer grout, and Hardware grout.
6. Joint filler materials.

PART 2 PRODUCTS

2.1 Precast Concrete Paving Panels, (PCPP).

Precast concrete repair panels, fabricated by a UDOT-Qualified Precast Supplier under the requirements of the Department's Quality Management Plan 505. Use concrete meeting the requirements of Section 03055, having a 28-day flexural strength of 650 psi and compressive strength of 4000 psi as established during trial batch. Do not place slabs until the required 28-day compressive strength has been reached.

- A. PCPP: Precast Concrete Pavement Panels are to be fabricated in two standard sizes; 12 ft wide x 12 long x 9 inch thick full panels, and 6 ft wide x 12 ft long x 9 inch thick half panels. Panels of different dimensions may be cast to assist with closure and fit with the approval of the Engineer.
 1. Place a single mat of uncoated reinforcing steel 2 inches from the bottom of the panel, that results in a ratio of steel area to concrete area of at least 0.0018 and a maximum bar spacing in both directions of 18 inches. Provide a minimum of 2 inches of cover to any exposed surfaces of the slab. Additional coated reinforcement may be provided to provide for loading the panels prior to under-slab grouting.
 2. Place lifting devices in each corner supplied from Dayton Superior or approved equal and capable of 8000 psi working load and angular lifting capacity. Provide lifting manufacturer details for approval at least 5 day prior to casting precast pavement panels. Position lifting devices as to avoid conflict with the load transfer bars, longitudinal tie dowel bars, and reinforcing steel.
 3. Provide for placement of longitudinal tie dowel bars (if required) as specified in the drawings or directed by the Engineer.
 4. Provide 9 grout ports for urethane leveling grout to provide support of the panel on the grade. Grout injection ports may be pre-cast or drilled after curing of precast concrete pavement panels.
 5. Prepare and clean the load transfer block outs (if used) prior to installation of the panels. Sides of the block-outs should be pre-formed or mechanically prepared to provide an irregular surface of 1/4" +/- to assist with bonding of the grout. Remove all traces of curing compound, oils and debris from block-out surfaces to be grouted or sealed by sand-blasting or other approved methods prior to placement.

- B. Hot mix asphalt (HMA) PG-64-28 may be used in place of precast concrete pavement half panels in shoulder and gore transition areas with the prior approval of the Engineer.
- C. Temporary Asphalt Paving may be used as a transition between each day's work with the approval of the Engineer. Contractor must adequately clean asphalt from joints to the satisfaction of the Engineer.

2.2 BASE REPAIR MATERIAL

Repair existing base material prior to setting new Precast Concrete Paving Panels.

- 1. Excavate or remove existing base material to match the dimensions of the precast concrete paving panel, urethane grout, untreated base course fill materials, and grinding.
- 2. Repair and re-grade existing base material. Replace base materials as needed using Untreated Base Course as per Section 02721. Compact base materials to meet other requirements of standard specifications and a finish within +/- 1/2 inch of desired profile.
- 3. The use of sand as a repair or bedding material that may be shown on plans as optional is not allowed.
- 4. Place plates or shims on grade to allow adjustment of leveling bolts prior to placement of precast panels. Adjust leveling bolts to reach the desired panel elevation prior to injection of urethane leveling grout.

2.3 URETHANE LEVELING GROUTING

Provide the following:

- 1. Provide a urethane leveling grout that develops 90% of its full compressive strength of 90 psi within 30 minutes of injection at 40 degrees F or greater at the following cured properties and other specifications:
 - i. Density: 6.0 lb/ft³ minimum.
 - ii. Tensile Strength: 120 psi minimum using ASTM D-790.
 - iii. Elongation: Maximum of 5.1%.
 - iv. Compressive Strength: 90 psi minimum using ASTM D-1621.
 - v. Flexural Strength (ASTM D-790): 80-180 psi.
 - vi. Shear Strength (ASTM C-273): 60-130 psi

2. An alternate cement based leveling grout may be used with the prior approval of the Engineer that meets the following properties established by trial batch:
 - i. Compressive Strength: 200 psi within 2 hours.
 - ii. Compressive Strength: 1000 psi within 24 days.
 - iii. Mix design which includes Type I, II, or III Portland Cement Concrete, a fluidifier, and water.
 - iv. Formulated mix to allow high fluidity, injection through preformed ports, distribution, and initial set within 1 hour.
3. Provide urethane leveling grout, or approved alternate material to meet the time required to open to traffic.

2.4 ENCASEMENT GROUT

- A. For precast concrete pavement panels with longitudinal or transverse joints in excess of 1/2 inch, provide a non-shrink encasement grout that meets the requirements of Section 02754 and reaches a compressive strength of 2500 psi before opening to traffic as established by trial batch, and 5000 psi within 24 hours. The encasement grout must be approved by the Engineer before placement.
- B. Restrict placement of encasement grout within the top 1 inch of panel joints to allow for hot pour sealant of joints.

2.5 HOT POURED JOINT SEALANT

Meet the requirements of Section 03152.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify locations and quantities of precast slab placement with the Engineer. Quantities listed in the contract are approximate. Contractor is required to provide construction survey necessary to ensure proper removal of existing pavement and placement of new panels.
- B. Develop a phasing plan that details:
 1. Traffic Control Plan including accommodations for Highway for Life Showcase event and protection of observers near work zone.
 2. Saw-cutting and removal of existing pavement.
 3. Preparation of base and leveling adjustments.
 4. Placement of precast panels.

5. Under-panel urethane leveling grout installation as required.
6. Load transfer bar, dowel bar installation and grouting.
7. Hardware removal and grouting.
8. Encasement grouting, grout port capping, and joint sealing.
9. Surface diamond grinding for finished profile within 7 days of installation of last panel.

3.2 PRE-PLACEMENT CONFERENCE AND TECHNICAL ASSISTANCE

- A. Convene a pre-placement conference at least 7 calendar days before the planned start of panel installation with the installation contractor, Engineer, grout suppliers, inspectors, designer, and any relevant subcontractors to review and coordinate all aspects of placement and inspection, including personnel requirements.
- B. Coordinate schedule and work activities with Highways for Life Showcase event planning.

3.3 REMOVE DAMAGED CONCRETE SLABS

- A. Protect the work area with appropriate barricades as per UDOT standard traffic control drawings and approved traffic control plan.
- B. Remove existing pavement panels or portions:
 1. Determine the extent and dimensions of the repair in cooperation with the Engineer.
 2. Saw cut dimensions should exceed the dimensions of the replacement slabs by approximately $\frac{3}{4}$ inch, and should be controlled to provide a constant line or curve to match with new panels.
 3. Complete the removal and make full depth cuts around the perimeter of the rectangular section to be removed. Minimize saw overcuts and repair them with an Epoxy repair material approved by the Engineer.
 4. Remove panels by a lift-out method or other method approved by Engineer. Use chains and lift pins to facilitate removal and minimize disturbance of the base material.
 5. Repair damage caused by removal operations to adjacent slabs and underlying base courses. Lean base courses may be repaired using untreated base course. The use of sand as a repair or bedding material is not allowed.
 6. Provide contingency plans for restoring traffic within time restrictions in the event that unforeseen problems occur with the installation of precast concrete pavement panels.

- C. Remove all loose particles of old concrete, before placing new Precast Concrete Pavement Panels.

3.4 PREPARE PCPP BASE

- A. Reconstruct the base to grade, and compact to standard specifications.
- B. Remove any excess material from around the edges of the excavation.

3.5 PLACE PRECAST PANELS

- A. Ensure complete removal of any curing compound or other deleterious material from dowel-bar block-outs, saw cut slots, and other bonding surfaces by sand-blasting or other method approved by the engineer prior to installation of panels.
- B. Place steel plates (or approved alternate) on grade below location of leveling bolts, or install shims to allow room for urethane leveling grout.
- C. Install precast concrete pavement panels to desired location.
- D. Adjust leveling bolts to reach desired elevation of pavement panels, matching with surrounding pavement profile and allowance for anticipated grinding. Panels are to be set within $\frac{1}{4}$ +/- of finished profile. Panels should be placed to allow for a $\frac{1}{4}$ inch longitudinal and transverse joints with a $\frac{1}{4}$ " +/- tolerance to allow for horizontal and vertical profile curvatures.
- E. Protect panels from damage until installation is complete. Remove debris from joints and block-outs as necessary.
- F. Remove and replace defective or damaged PCPP at no cost to the Department.
- G. Protect adjacent pavements from damage during removal and installation of new panels.

3.6 INSTALL URETHANE LEVELING GROUT

- A. Install under panel urethane leveling grout through injection ports (prefabricated or drilled), in accordance to the manufacturer's specifications for equipment, materials and workmanship.
- B. Installation work of under-panel urethane leveling grout should follow behind the placement of at least 2 adjacent panels to allow for adjustments in profile.

- C. Place preformed strip seal within 3 inches of panel edges on bottom surface of precast pavement panels to prevent urethane grout from contaminating panel joints. Secure strip seal to ensure movement does not occur during urethane grout injection.
- D. Excess grout should be removed or cleaned from joints prior to placement of encasement grout and joint materials.
- E. Placement of urethane leveling grout shall be controlled to prevent undesired lifting of panels.
- F. Adjust the material properties to meet the weather conditions and traffic requirements of the project.

3.7 INSTALL LOAD TRANSFER DOWEL BARS, TIE BARS, AND OTHER HARDWARE

- A. Install load transfer devices on transverse joints as required in standard drawings, plans and Section 02754 Dowel Bar Retrofit.
- B. Adjust material properties and installation of load transfer bar patching material to meet the weather conditions and traffic requirements of the project.
- C. Field saw cut and install new longitudinal joint tie bars as required by the Engineer. Avoid placement of tie bars within 18 inches of damaged areas or joints of adjacent panels.
- D. Install encasement grout as specified in Article 2.4, Verify grout strength using field-cured cylinders, cubes, or maturity meters to the satisfaction of the Engineer. If damage occurs under traffic due to low strength, repair the installation to the satisfaction of the Engineer.
- E. Remove or field cut leveling bolts at a minimum of 1 inch below the top surface of the panel. Remove lifting hardware. Repair lifting block-outs, grout ports and leveling bolt hardware block-outs using grout as specified under Section 02754 patching materials with adjustments to meet weather and traffic requirements.

3.8 SEAL JOINTS

- A. Ensure that joints and bonding surfaces are still free from deleterious material.

- B. Seal all transverse joints greater than 1/2 inch and longitudinal joints greater than 3/4 inch with encasement grout or other approved non-shrink grout or epoxy.
- C. Seal all other joints with hot-poured joint sealant as per Section 03152. For joints narrower than 1/8", saw cut joints as per Standard Drawings prior to sealing.

3.9 GRINDING

Grind PCPP installations in accordance with Section 02981, with the exception that Section 3.2 does not apply. Complete final profile grinding within 7 days of placement of final precast concrete pavement panel.

3.10 LIMITATIONS

Ensure that grout, backfill and other materials are suitable (based upon manufacturers' recommendations) for the weather conditions and traffic requirements that may exist at the time of installation. Provide contingency instructions and/or alternate materials for potential extreme weather events.

END OF SECTION